

## WE CLAIM:

1. A fuel supply for a fuel cell, the fuel cell having an anode and a cathode, the fuel supply comprising:

a fuel storage area, the fuel storage area having a volume;

a fuel solution outlet configured to pass a fuel solution from the fuel storage area;

a waste storage area, the waste storage area having a volume;

a waste inlet configured to pass waste into the waste storage area;

and

a movable barrier separating the fuel storage area and the waste storage area, wherein the movable barrier is configured to move as the fuel solution is passed from the fuel storage area and a waste is passed into the waste storage area to simultaneously decrease the volume of the fuel storage area and increase the volume of the waste storage area.

2. The fuel supply of claim 1, wherein the movable barrier surrounds the fuel storage area.

3. The fuel supply of claim 2, wherein the movable barrier is a first flexible bag, the fuel supply further comprising a second flexible bag surrounding the waste storage area.

4. The fuel supply of claim 3, wherein the first flexible bag is disposed within the second flexible bag such that expansion of the volume of the waste storage area compresses the fuel storage area from a plurality of directions.

5. The fuel supply of claim 3, wherein the first flexible bag and the second flexible bag are disposed in a side-by-side arrangement.

5 6. The fuel supply of claim 1, wherein the movable barrier includes a metal layer for facilitating heat exchange between the waste storage area and the fuel storage area.

10 7. The fuel supply of claim 1, the movable barrier being a flexible bag with a multi-layer construction, the multi-layer construction including an inner gas barrier layer disposed between layers resistant to the fuel solution.

15 8. The fuel supply of claim 7, wherein the inner gas barrier layer includes a liquid crystal polymer sheet.

20 9. The fuel supply of claim 1, wherein the fuel cell is a hydrogen fuel cell.

25 10. The fuel supply of claim 9, wherein the fuel solution is a borohydride solution.

30 11. The fuel supply of claim 10, wherein the waste includes borate waste product.

12. The fuel supply of claim 9, wherein the waste includes water produced at the cathode.

13. The fuel supply of claim 1, wherein the fuel cell is a direct methanol fuel cell.

14. The fuel supply of claim 1, wherein the fuel cell is a solid oxide fuel cell.

15. The fuel supply of claim 1, wherein the fuel solution includes an alcohol.

16. The fuel supply of claim 15, wherein the alcohol is selected from the group consisting of ethanol and methanol.

17. The fuel supply of claim 1, wherein the fuel includes a liquid hydrocarbon.

18. The fuel supply of claim 17, wherein the liquid hydrocarbon is selected from the group consisting of gasoline, pentane, kerosene and diesel.

19. The fuel supply of claim 1, wherein the waste storage area includes a waste-absorbing material.

20. The fuel supply of claim 19, wherein the waste-absorbing material is a super-absorbent material.

21. The fuel supply of claim 20, wherein the super-absorbent material is selected from the group consisting of cross-linked polyacrylic acid salts, polyvinyl alcohol, poly(2-hydroxyethyl methacrylate)/poly(ethylene oxide), isobutylene-maleic acid copolymer derivatives, poly(methacrylic acid) salts, poly(acrylamide) and polyvinylpyrrolidone.

22. The fuel supply of claim 1, further comprising a pressurizer configured to apply a positive pressure to the movable barrier to direct the fuel solution to flow out of the fuel storage area.

23. The fuel supply of claim 22, wherein the pressurizer is a spring configured to push against the movable barrier.

24. The fuel supply of claim 1, wherein the fuel supply is configured to be coupled with an electronic device, and wherein the fuel solution outlet and waste inlet include self-sealing fluidic couplers configured to couple with complementary fluid couplers of the electronic device.

25. The fuel supply of claim 24, wherein the self-sealing fluidic couplers each include a septum configured to couple to a complementary needle on the device.

26. The fuel supply of claim 25, wherein the self-sealing fluidic couplers include a sealing ball positioned beneath the septum and biased with a spring toward the septum.

27. The fuel supply of claim 1, wherein the outer container includes a keying element configured to direct the fuel supply into a fuel supply receptacle in an electronic device in a correct orientation.

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28. The fuel supply of claim 27, wherein the keying element includes a tab configured to fit in a complementary slot in the electronic device.

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29. The fuel supply of claim 1, further comprising a catalyst fluidly coupled to the fuel storage area for producing a fuel from the fuel solution.

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30. A fuel supply for supplying a fuel solution to a fuel cell and storing a waste product generated by operation of the fuel cell, the fuel supply comprising:

a container having an interior, a fuel solution outlet and a waste inlet; and

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a divider partitioning the interior into a fuel storage area and a waste storage area, the fuel storage area having a fuel volume and the waste storage area having a waste volume, wherein the divider is impermeable to the fuel solution and the waste product, and wherein the divider is configured to allow the fuel volume and the waste volume to change inversely as the fuel solution is removed from the fuel storage area.

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31. A fuel cell system, the fuel cell system including a fuel cell and a fuel supply for supplying a fuel solution to the fuel cell, wherein operation of the fuel cell produces a waste product, the fuel supply comprising:

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a first bounded volume configured to hold the fuel solution, the first bounded volume being in fluid communication with a fuel solution outlet configured to pass the fuel solution out of the fuel supply; and

a second bounded volume configured to hold the waste product, the second bounded volume being in fluid communication with a waste product inlet, wherein the first bounded volume and second bounded volume are contained within a fixed volume, and wherein the first bounded volume and the second bounded volume are configured to vary inversely to one another as the fuel solution is passed from the first bounded volume and waste is passed into the second bounded volume.

32. A fuel supply for a fuel cell, comprising:  
an outer container;  
a fuel storage area defined within the outer container, the fuel storage area being configured to hold a fuel solution, and the fuel storage area having a fuel volume;  
a fuel solution outlet configured to pass a fuel solution from the outer container;  
a waste storage area defined within the outer container, the waste storage area being configured to hold a waste, and the waste storage area having a waste volume;  
a waste inlet configured to pass the waste into the outer container;  
a movable barrier separating the fuel storage area and the waste storage area, wherein the movable barrier is configured to move as the fuel solution is passed from the outer container and the waste is passed into the outer container to simultaneously decrease the volume of the fuel storage area and increase the volume of the waste storage area; and  
a catalyst in fluid communication with the fuel storage area, wherein the fuel solution flows from the fuel storage area over the catalyst to produce a fuel for passage downstream to the fuel cell.

33. The fuel supply of claim 32, wherein the fuel storage area is defined by a first inner container, and wherein the waste storage area is defined by a second inner container.

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34. The fuel supply of claim 33, further comprising a third inner container configured to contain a reactant that reacts with the fuel solution at the catalyst to produce the fuel.

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35. The fuel supply of claim 34, wherein the reactant is water.

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36. The fuel supply of claim 32, further comprising a pump to transfer fuel solution to the catalyst.

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37. The fuel supply of claim 36, further comprising a pump control system configured to sense fuel cell performance and to control transfer of the fuel solution to the catalyst based on the fuel cell performance.

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38. The fuel supply of claim 37, wherein the pump control system includes a pressure sensor configured to detect hydrogen pressure downstream of the catalyst.

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39. The fuel supply of claim 37, wherein the pump control system includes a voltage meter to detect voltage across the fuel cell.

40. A fuel supply for a fuel cell, the fuel cell having an anode and a cathode, the fuel supply comprising:

a fuel storage area;

a fuel solution outlet configured to pass a fuel solution from the fuel storage area;

a waste storage area;

a waste inlet configured to pass waste into the waste storage area;

and

a keying element configured to direct the fuel supply into a fuel supply receptacle in an electronic device in a correct orientation.

41. The fuel supply of claim 40, wherein the keying element includes a tab configured to fit in a complementary slot in the electronic device.

42. The fuel supply of claim 40, wherein at least one of the fuel solution outlet and waste inlet includes a self-sealing coupler.

43. The fuel supply of claim 42, wherein the self-sealing coupler includes a ball-and-spring valve.

44. The fuel supply of claim 42, wherein the self-sealing coupler includes a septum.

45. The fuel supply of claim 40, wherein the keying feature is disposed in an asymmetric relation to the fuel solution outlet and the waste inlet.



46. The fuel supply of claim 40, wherein the keying feature includes first and second keying elements disposed in an asymmetric relation to each other.

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47. The fuel supply of claim 40, the fuel supply being configured to be installed in a complementary receptacle and having a leading end relative to a direction in which the fuel supply is installed in the complementary receptacle, wherein the fuel solution outlet and waste solution inlet are disposed at the leading end of the fuel supply.

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48. The fuel supply of claim 47, the fuel supply having a trailing end opposite the leading end, further comprising a handle disposed on the trailing end.

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49. The fuel supply of claim 47, wherein the keying element is disposed adjacent the leading end of the fuel supply.

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50. The fuel supply of claim 40, wherein the keying element is indicative of a type of fuel stored in the fuel supply.

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51. The fuel supply of claim 40, wherein the keying element is indicative of a grade of fuel stored in the fuel supply.

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52. The fuel supply of claim 40, wherein the keying element is indicative of a safety aspect of the fuel stored in the fuel supply.

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